Nilay Kushawaha

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Profile Summary

Final-year doctoral research candidate in Continual Learning and Robotics with a strong track record in designing adaptive AI algorithms for robotic control, multimodal data fusion, and soft robot behavior modeling. Experienced in real-time control, reinforcement learning, and sensor data processing. Proven ability to bridge theory and practice through publications in top-tier journals and hands-on robotics experiments. Passionate about translating cutting-edge research into impactful industrial applications.

Work Experience

Visiting Researcher, National University of Singapore, Singapore *June 2025 – September 2025*
(Prof. Cecilia Laschi) ⧉

- Developed dynamic continual learning algorithms for modular soft robot control to enable localized preicse control.
- Tested the controller in real-time for trajectory tracking and dynamic reaching tasks, achieving an error less than 6 mm in position and 3° in orientation.

Master's Thesis Project, Jefferson Lab, U.S.A *July 2021 – July 2022*
(Dr. Yulia Furletova) ⧉

- Simulated and modeled the Gas Electron Multiplier (GEM) detector for Electron-Ion Collider ⧉ project.
- Applied AI algorithm for extracting sensitive particle signals from high-noise environment, improving detection accuracy.

Education

Scuola Superiore Sant'Anna, Pisa, Italy *Oct 2022 – April 2026*
PhD in Biorobotics & AI (Supervisor : Prof. Egidio Falotico ⧉ *)* *(Tentative)*

- Credits : 20/20
- Coursework: Machine Learning, Brain Inspired Control, Finite Elements Methods, Deep Learning for Medical Imaging, Robot Programming, Ethics in AI.

Indian Institute of Technology, Indore, India *July 2020 – July 2022*
Master of Science (M.Sc) in Physics (Supervisor : Prof. Ankhi Roy ⧉ *)*

- CGPA : 8.65/10
- Coursework: Mathematical Physics, Statistical Mechanics, Classical Mechanics, Quantum Mechanics, Detector Physics.

University of Delhi, Delhi, India *Bachelor of Science (B.Sc) in Physics* *July 2020 – July 2022*

- CGPA : 8.46/10
- Coursework: Numerical Methods, Introduction to Programming, Computational Physics, Digital/Analog Electronics, Modern Physics.

Selected Publications and Pre-Prints

- SynapNet: A Complementary Learning System Inspired Algorithm With Real Time Application in Multimodal Perception, **Nilay Kushawaha**, L. Fruzetti, E. Donato, E. Falotico, ***IEEE Transactions on Neural Networks and Learning Systems (2024)***, *Paper link* ⧉
- Continual Learning for Multimodal Data Fusion of a Soft Gripper, **Nilay Kushawaha**, E. Falotico, ***Wiley Advanced Robotics Research (2025), *Paper link* ⧉
- AGPNN: A Dynamic Architecture based Continual Reinforcement Learning Algorithm for Robotic Control, **Nilay Kushawaha**, G. Perovic, E. Donato, E. Falotico, ***Under Review (IEEE Transactions on Systems, Man, and Cybernetics: Systems)***
- Adaptive Drift Compensation for Soft Sensorized Finger Using Continual Learning, **Nilay Kushawaha**, R.

Pathan, N. Pagliarani, M. Cianchetti, E. Falotico, ***IEEE Robosoft Conference (2025)***, *Paper link* 🔗

○ Domain Translation of a Soft Robotic Arm Using Conditional Cycle Generative Adversarial Network, **Nilay Kushawaha**, C. Alessi, L. Fruzetti, E. Falotico, ***IEEE International Conference on Robotic Systems and Applications (2025)***, *Paper link* 🔗

Skillset

Programming Languages : Python, C++, Scilab, SQL

AI Skills : Machine Learning, Deep Learning, Continual Learning, Reinforcement Learning, Generative AI, Data-driven Control

Platforms & **Misc. :** VSCode, Pytorch, Arduino, Basics of Ethical Hacking, ROS 1, Labview, Franka ROS, Scikit-learn, Numpy, Pandas, Github, HTML5, CSS, Latex

Soft Skills: Leadership, Teamwork, Adaptability

Training & Certifications

○ Advanced Course on Data Science & Machine Learning (Italy, 2024).

○ Fundamentals of Deep Learning (Nvidia, India, 2021).

○ 1st Indian Workshop on Artificial Intelligence (IIT Indore, India, 2021).

Organizational Activities

○ Created 4 hour tutorial video on "Advancements in Continual Learning for Robotics" for the Ebrains-Italy 🔗 project.

○ Student Coordinator, Dept. of Physics, IIT Indore.

○ Robotics Club Coordinator, University of Delhi.

Achievements & Awards

○ Recipient of Enfield 🔗 AI Scholarship 2025 for exchange.

○ Recipient of full PhD scholarship at Scuola Superiore Sant'Anna.

○ Recipient of Ishan Uday undergraduate scholarship for 3 consecutive years.

○ Undergraduate 2nd semester examination topper.